Definition of U and physical arrangement used (Diagram)

WTC - EXTERIOR WALL INSULATION

SPANDRELS AND EXTERIOR COLUMNS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION
(In Order of Max. Thermal Reduction)

VALUES BASED ON WALL & COLUMN DESIGN
As of May 5, 1966
(DRAWING A-P-303)

MATERIAL	(Resistivity) "K"	(Conductance) "C"	"U" Thermal Reduction Value				
			At Sides of Column		At Outside Face of Column (w/Air Space)		
			With 1-5/8" F.P.	With 3/8" Polyurethane Included	With 1-5/8" F.P.	With 3/8" Polyurethane Incl.	With 2" F.P. and 3/8" Polyurethane
Sprayed Mineral Fibre (Spraycraft or Cafco)	0.04	0.24	0.23	0.20	0.19	0.16	0.14
Sprayed (Cementitious) Vermiculite (Monokote)	0.06	0.36	0.34	0.26	0.24	0.20	0.18
Laminated Gypsum Board (U. S. G. Fire Code)	0.15	0.90	0.79	0.39	0.46	0.27	0.25
Concrete (L.W. 100 PCF)	0.30	1.80	1.37	0.41	0.53	0.30	0.29
Gypsum Plaster	0.50	3.00	2.05	0.51	0.60	0.32	0.31

Source of these value and their clear definition are important.

PA LAW DEPARTMENT
58899

WTC - EXTERIOR WALL INSULATIONS

SPANDRELS AND EXTERIOR COLUMNS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION coefficients
~~(In Order of Max. Thermal Reduction)~~

VALUES BASED ON WALL & COLUMN DESIGN
As of May 5, 1966

	MATERIAL	CONDUCTIVITY (k) BTU / HR-SF-°F-IN ~~(Resistivity) 1/k~~	RESISTANCE (R) HR-SF-°F-IN / BTU ~~(Conductance) 1/U~~	"U" - COEFF. TRANSMISSION - BTU/HR-SF-°F ~~Thermal Reduction Value~~ At Sides of Column: With 1-5/8" F.P.	At Sides of Column: With 3/8" Polyurethane Included	At Outside Face of Column (w/Air Space): With 1-5/8" F.P.	At Outside Face of Column (w/Air Space): With 3/8" Polyurethane Incl.	At Outside Face of Column (w/Air Space): With 2" F.P. and 3/8" Polyurethane
1.	Sprayed Mineral Fibre (Spraycraft) ~~or Gefco~~	~~0.04~~ .26	~~0.24~~ 3.85	~~0.23~~ .141	~~0.20~~ .107	~~0.19~~ .124	~~0.16~~ .097	~~0.14~~ .086
2.	Sprayed (Cementitious) Vermiculite (Monokote)	~~0.00~~ .25	~~0.36~~ 1.32	~~0.27~~ .332	~~0.20~~ .192	~~0.24~~ .25	~~0.20~~ .162	~~0.16~~ .138
3.	Laminated Gypsum Board (U. S. G. Fire Code)	~~0.15~~ 1.11	~~0.90~~ .9	~~0.79~~ .133	~~0.99~~ .222	~~0.46~~ .305	~~0.27~~ .183	~~0.25~~ .172
4.	Concrete (L.W. 100 PCF)	~~0.30~~ 3.57	~~1.80~~ .28	~~1.37~~ .767	~~0.41~~ .285	~~0.53~~ .44	~~0.30~~ .224	~~0.29~~ .218
5.	Gypsum Plaster (Sand-Aggregate)	~~0.50~~ 1.56	~~0.80~~ 1.64	~~2.05~~	0.53 1 1/8	0.60	0.32	0.31 U = .312
5	[illegible]	.35	2.[illegible]	.195	.137	.164	.12	.108
6	[illegible]	.27	3.7	.146	.11	.128	.097	.088
7.	POLYURETHANE	.17	5.[illegible]					

WORLD TRADE CENTER

EXTERIOR WALL, SPANDRELS AND EXTERIOR COLUMN INSULATIONS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS

Value Based on Wall & Column Design As of 5/5/66
Drawing A-A-314

Fireproofing Material	Conductivity (k) BTU / HR-SF-°F-IN	"U" - Coefficient Transmission - BTU/HR-SF-°F At Sides of Column		At Outside Face of Column (w. Air Space)		
		With 1 5/8" F.P.	With 3/8" Polyurethane Included	With 1 5/8" F.P.	F.P. With 3/8" Polyurethane Included	With 2" F.P. and 3/8" Polyurethane
1. Sprayed Mineral Fiber (Sprayecraft)	.26	0.135	0.116	.136	.104	.092
2. Sprayed (Cementitious) Vermiculite (Monokote)	.75	0.302	.221	.302	.182	0.167
3. Laminated Gypsum Board (U. S. G. Fire Code)	1.11	0.385	.261	.385	.209	.195
4. Concrete (L.W. 100 PCF	3.57	0.630	.353	.625	.264	.256
5. Vermi	.38	0.185	.151	.185	.131	0.116
6. Cafco	.27	0.140	.119	.140	0.107	0.093

Notes:

1. Fireproofing for inside face of column is assumed to be 1 3/8" gypsum plaster having conductivity of 1.56 and the overall transmission coeff. of .396 between the room and column steel.
2. Inside still air film resistance is taken as .68
3. Outside air film resistance is taken as .17
4. Air space resistance is taken as .97
5. Conductivity of polyurethane is taken as .17

NC:rt,dd

PRELIMINARY STUDY

6. MR. H. C. GROPP
H. MIN. PROD. CO.
STANHOPE, N.J. 07874
M-DI-7-4390
N.J. 201-347-1200

MR. KELLY 10TH
SMITH & KANZLER CO.
1414 EAST LINDEN AVE
LINDEN, N.J.
N.Y.C. 212-964-5265
N.J. 201-925-2100

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EXTERIOR WALL, SPANDRELS AND EXTERIOR COLUMN INSULATIONS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS

Value Based on Wall & Column Design As of 5/5/66
Drawing A-A-314

Fireproofing Material	Conductivity (k) BTU / HR-SF-8F-IN	"U" - Coefficient Transmission - BTU/HR-SF-OF				
		At Sides of Column		At Outside Face of Column (W/Air Space)		
		With 1 5/8" F. P.& Air Space	1 5/8" F. P.+ 3/8" Urethane No Air Space	With 1 5/8" F. P.	1 5/8" F. P.+ 3/8" Urethane	With 2" F.P. and 3/8" Polyurethane
1. Sprayed Mineral Fiber (Spraycraft)	.26	0.135	0.116	.136	.104	.092
2. Sprayed (Cementitious) Vermiculite (Monokote)	.75	0.302	.221	.302	.182	0 .167
3. Laminated Gypsum Board (U.S.G. FireCode)	1.11	0.385	.261	.385	.209	.195
4. Concrete (L.W. 100 PCF)	3.57	0.630	.353	.625	.264	.256
5. Vonco	.38	0.185	.151	.185	.131	0.116
6. Cafco	.27	0.140	.119	.140	0.107	0.093

Notes:
1. Fireproofing for inside face of column is assumed to be 1 3/8" gupsum plaster having conductivity of 1.56 and the overall transmission coeff. of .396 between the room and column steel.
2. Inside still air film resistance is taken as .68
3. Outside air film resistance is taken as .17
4. Air space resistance is taken as .97
5. Conductivity of polyurethane is taken as .17

NC:rt,dd,fk

DX 1222